Wildfires and Fires

Wilderness wildfires and non-wilderness fires (primarily structural fires in urban areas) account for the most fatalities and economic losses of all hazards affecting West Virginia. Statistics collected by the State Fire Marshal's Office (SFMO) and the Division of Forestry (DF) show that most fires are caused by arson or negligence; few fires of any type are the result of natural causes. Fires in the state do not normally affect large areas, so fires as a hazard class are not as apparent a problem unless an unusually large fire occurs or one looks at the effects of many incidents added together over time. Figure 8.7A highlights the areas of West Virginia that traditionally sustain the most damage from wildfires.

Hazard Terminology
Wildfires – Highly destructive, uncontrolled fire or any instance of uncontrolled burning.
Wilderness Wildfires – Uncontrolled burning in woodlands, grasslands, or brushlands.
Urban Interface Fires – Instances of uncontrolled burning in areas where urbanization (residential/commercial development) meets largely undeveloped forestlands.

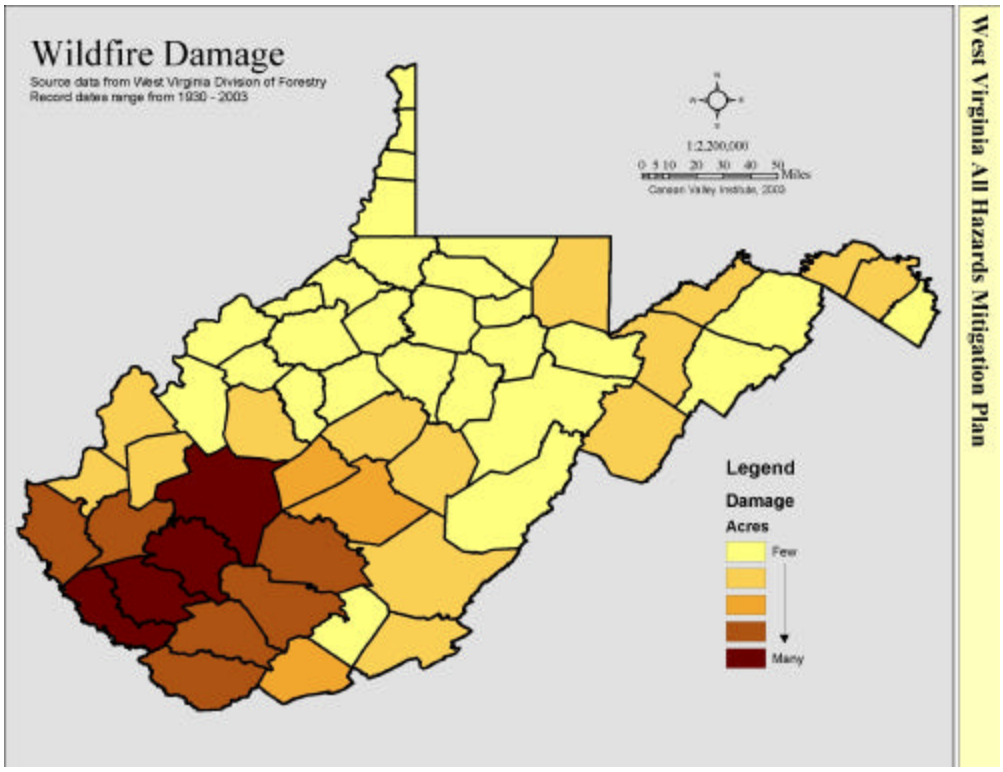

Figure 8.1A: Map of Wildfire Damage in West Virginia (WVDOF)

Non-wilderness Fires

Non-wilderness fires in West Virginia are generally investigated and documented by the West Virginia SFMO. Fires that the SFMO investigates are grouped by ignition classes such as unknown, incendiary, suspicious, misuse of heat, misuse of material, mechanical failure, construction deficiency, operational deficiency, natural condition, and animal/rekindle. The SFMO has compiled statewide statistics for mostly structural, non-wilderness fires since 1995. The SFMO statistics also include grassland fires and vehicle fires that constitute a very small portion of the total fire incidents recorded.

In 1995, non-wilderness fires numbered 9,172 separate incidents resulting in 28 deaths and 323 nonfatal injuries. The counties with the most frequent non-wilderness fire occurrences were Kanawha County (914), Cabell County (609), Berkeley County (438), Mercer County (419), and Wood County (380). Losses from these fires in 1995 totaled $70,813,909.

In 1996, non-wilderness fires numbered 8,059 incidents with 46 deaths and 329 nonfatal injuries. Total losses from these fires were $89,706,666, with most of the losses categorized under the unknown ignition type. Mechanical failure caused the next highest loss level. The counties with the most frequent non-wilderness fire occurrences were Kanawha County (778), Cabell County (642), Mercer County (377), Raleigh County (304), and Wood County (389).

In 1997, non-wilderness fires numbered 8,136 incidents resulting in 52 deaths and 264 casualties. Total losses from these fires totaled $85,946,781. The unknown ignition class was the most devastating, followed by mechanical failure. The counties with the most frequent non-wilderness fire occurrences were Kanawha County (779), Cabell County (573), Mercer County (327), Raleigh County (306), and Wood County (399).

In 1998, non-wilderness fires numbered at 7,957 incidents resulting in 45 deaths and 239 injuries. Total losses from these fires were at $72,788,199. Unknown ignition fires caused the highest amount of damages, followed by mechanical failure.

While statistics describing non-wilderness fires are incomplete for 1999, the WVSFMO reported that in 2000-2001, fire investigation requests numbered 738 and involved 41 fatalities. Most of these fires were of the incendiary ignition type in residential structures.

In 2001-2002, 908 non-wilderness fires were investigated by the WVSFMO. These fires resulted in 36 fatalities, mostly in residential structures. The primary ignition type was incendiary, followed closely by unknown ignition type.

From 2002-2003, 1,049 fires were investigated by the WVSFMO. These fires resulted in 53 fatalities. The incendiary and unknown ignition types were most prominent.

Wilderness Wildfires

In the last 10 years (1991-2000), West Virginia has averaged 1,080 wildfires per year. These fires burned an average of 65,435 acres per year (Figures 8.7B and 8.7C). The total value of forest resources and other property damage from wildfires that occurred in the state from 1991-2000 was $196,700,200. This loss value includes timber on forested and non-forested lands, homes and structures, and fire suppression costs.

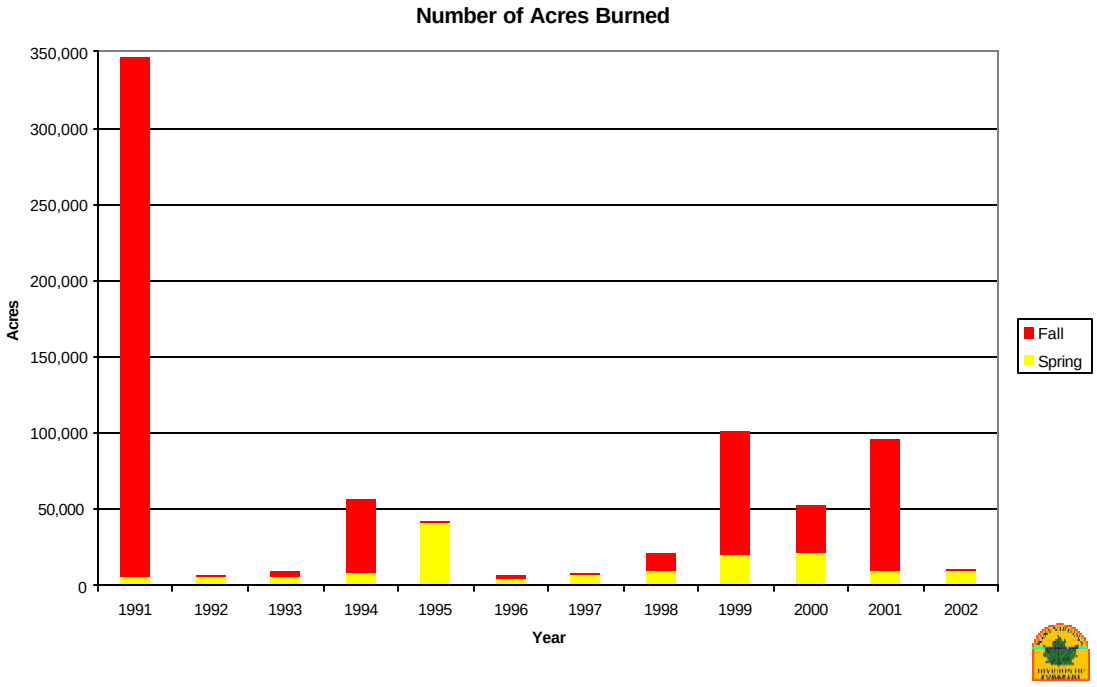

Figure 8.1B: Acres Burned by Wildfires During Fall-Spring Burning Seasons 1991-2002

Two of the largest wildfires in recent years occurred in 2001. That year saw the occurrence of two federally declared fire disaster complexes, the Trough-Smokehole Wildfire Complex and the Southwest West Virginia Wildfire Complex in the southern and eastern portions of the state. The Trough-Smokehole Complex was centered in Grant and Hardy counties, and the Southwest West Virginia Complex affected Boone, Cabell, Kanawha, Lincoln, Logan, McDowell, Mercer, Mingo, Raleigh, Wayne, and Wyoming counties. These large wildfires burned for four and three weeks, respectively, and were responsible for more than $105 million in damages. Fire suppression costs for these fires exceeded $500,000 statewide. As a result of these two fires, West Virginia received more than $1.8 million in federal grant assistance from the National Fire Plan Program

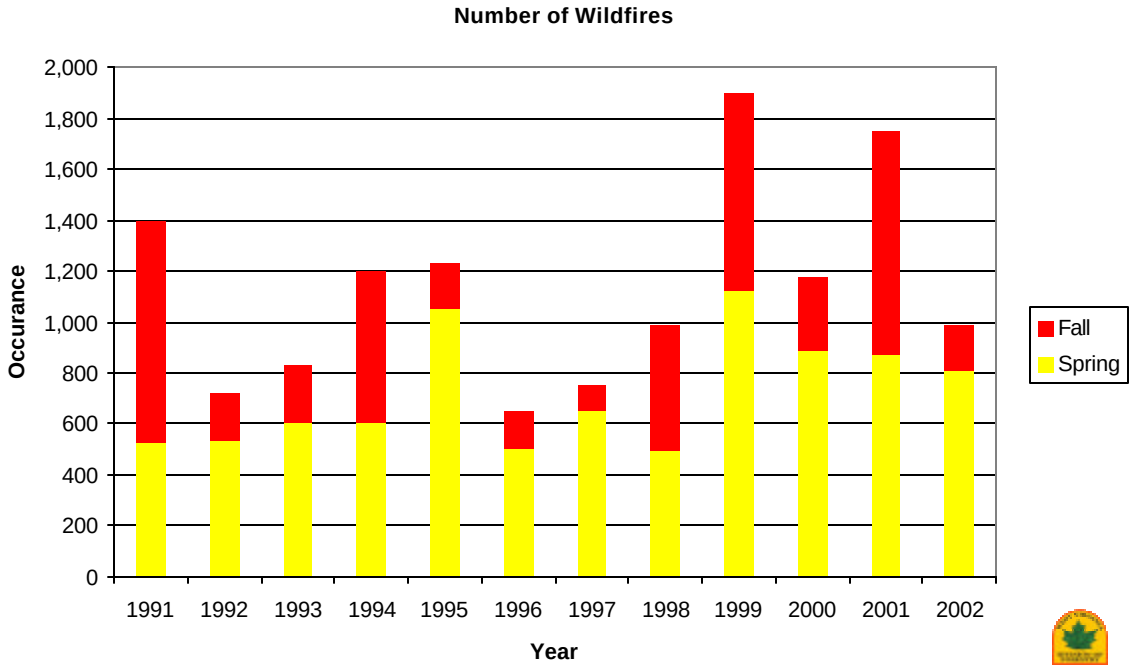

Figure 8.1C: Number of Wildfires from 1991-2002.

Wilderness wildfires consist of uncontrolled burning in woodlands, grasslands, or brushlands of generally more than 50 acres. Urban interface fires consist of uncontrolled burning in areas where urbanization (residential or commercial development) meets largely undeveloped forested lands. Wildfires commonly begin unnoticed and spread quickly by burning combustible vegetative fuels. The occurrence of wildfires depends largely on the amount of fuel, wind direction and speed, weather conditions, and the effectiveness of fire prevention measures. Further, the steep terrain and the aspect of the slopes were major contributors to the fires becoming large in the Trough-Smokehole Wildfire Complex and the Southwest West Virginia Wildfire Complex.

The economic history of West Virginia's forests makes it particularly vulnerable to wildfires. Almost all of West Virginia's forests were cleared by logging activities between 1890 and 1920. The residual forest detritus and the subsequent proliferation of understory species provided the perfect fuel for future wildfires experienced throughout the state.

Other factors contributing to wildfires across the state include the scarcity of fire-resistant species, numerous heavy public use areas on forested lands (e.g., camping, and hiking), deteriorating and neglected buildings, areas prone to lightning strikes (e.g., high ridges, mountains), drought, windy conditions, lack of adequate fire prevention and/or suppression apparatus, increased arson activity, presence of non-indigenous flora, and lack of proper supervision during debris burning in rural areas.

Over the past 70 years, the majority of fires in the state have occurred in 10 counties in southwestern West Virginia. The West Virginia Division of Forestry (WVDOF) asserts that southern West Virginia counties have been subject to more concentrated effects from wildfires, accounting for 56 percent of all wildfires and representing 95 percent of all acres burned in the state (figures 8.7A, 8.7E, 8.7F, and 8.7).

Arson is the most frequently reported cause of wildfires in West Virginia. Figure 8.1D shows the distribution of wildfires by cause in West Virginia.

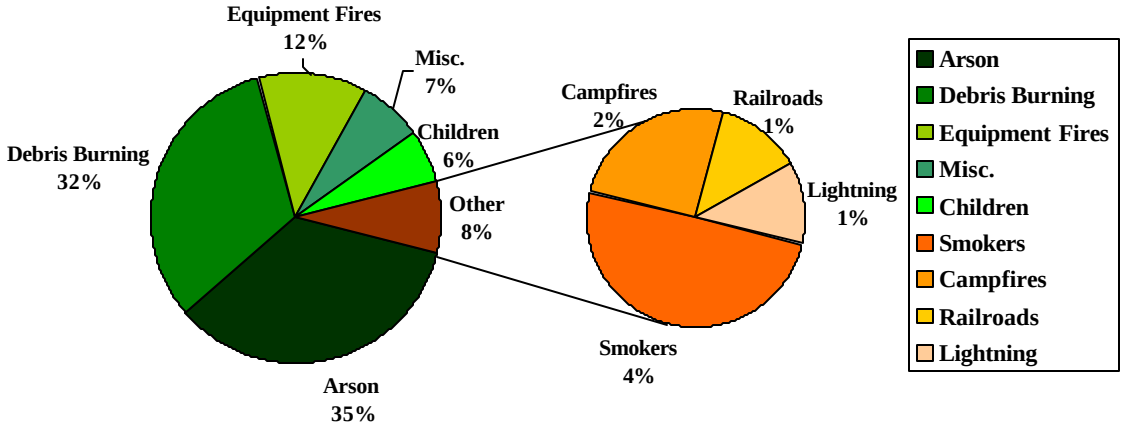

Figure 8.1D: Causes of Wildfires 1993-2003 (West Virginia Forestry Association)

Wildfires not only kill trees, but they also destroy and damage all facets of the forest ecosystem. Burned and damaged trees become more susceptible to disease, and wildlife habitat is destroyed. Wildfires also result in severe soil erosion that pollutes and increases sedimentation in streams. The smoke and ash from wildfires also causes varying degrees of air pollution. Previously burned trees may appear to be healthy a few years after the fire; but damage has already occurred. It may take up to 20 years for the trees to die. Such trees can never be harvested for quality timber.

Along with these ecological effects, wildfires can denude thousands of acres of forest, exposing the earth to the damaging effects of rain, wind, and other climatic events. As a result, the risks of flooding, mudflows, and landslides are greatly increased. The destruction of trees and natural ground cover by wildfires increases storm water runoff that may cause or exacerbate downstream damages due to flooding. Dead trees and other fire debris can obstruct hydraulic structures such as bridges, dams, and culverts, causing increased flooding. Mudflows and landslides can occur when heavily saturated earth liquefies and flows down slopes. In the wake of the devastating wildfires in southern California in the fall of 2003, a significant effort was made to warn and prepare residents and emergency workers of these dangerous aftereffects.

Forest clear-cutting can cause a slight increase in the amount of runoff during the first year but results in a decrease in the amount of runoff for the next three to five years according to research at the Fernow Experimental Forest in West Virginia, which is operated by the USDA Forest Service.

According to WVDOF, paved surfaces, construction, and soil compaction in many mined areas and unpaved roads cause a permanent increase in runoff and also greater channelization of water. The effect of severe wildfires is not as permanent but is long lasting. The fire removes the litter layer, which acts to hold precipitation in place long enough for it to infiltrate the soil. Fire bakes the soil surface layer and breaks down its structure, which closes the openings that allow the infiltration of water into the lower soil layers.

WVDOF reports that a wood fiber study has been started, which shows potential for mitigating the effects of soil compaction and wildfires. Species that rapidly provided shade and development of a litter layer were planted. Within five years, the beginning of a surface soil horizon with real permeability and the establishment of native plants, was observed within the planted area.

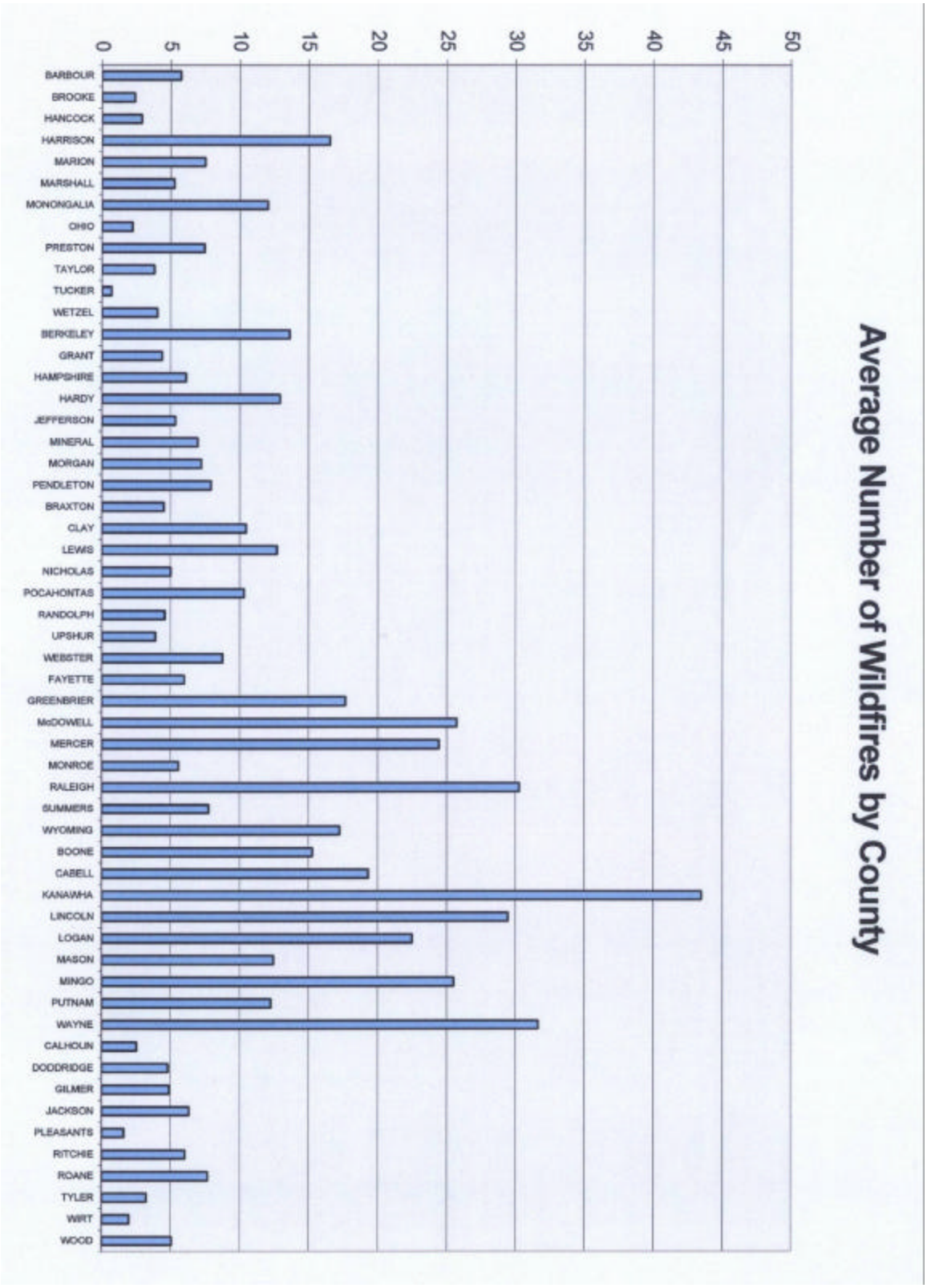

Figure 8.1E: Average Number of Wildfires by County in West Virginia.

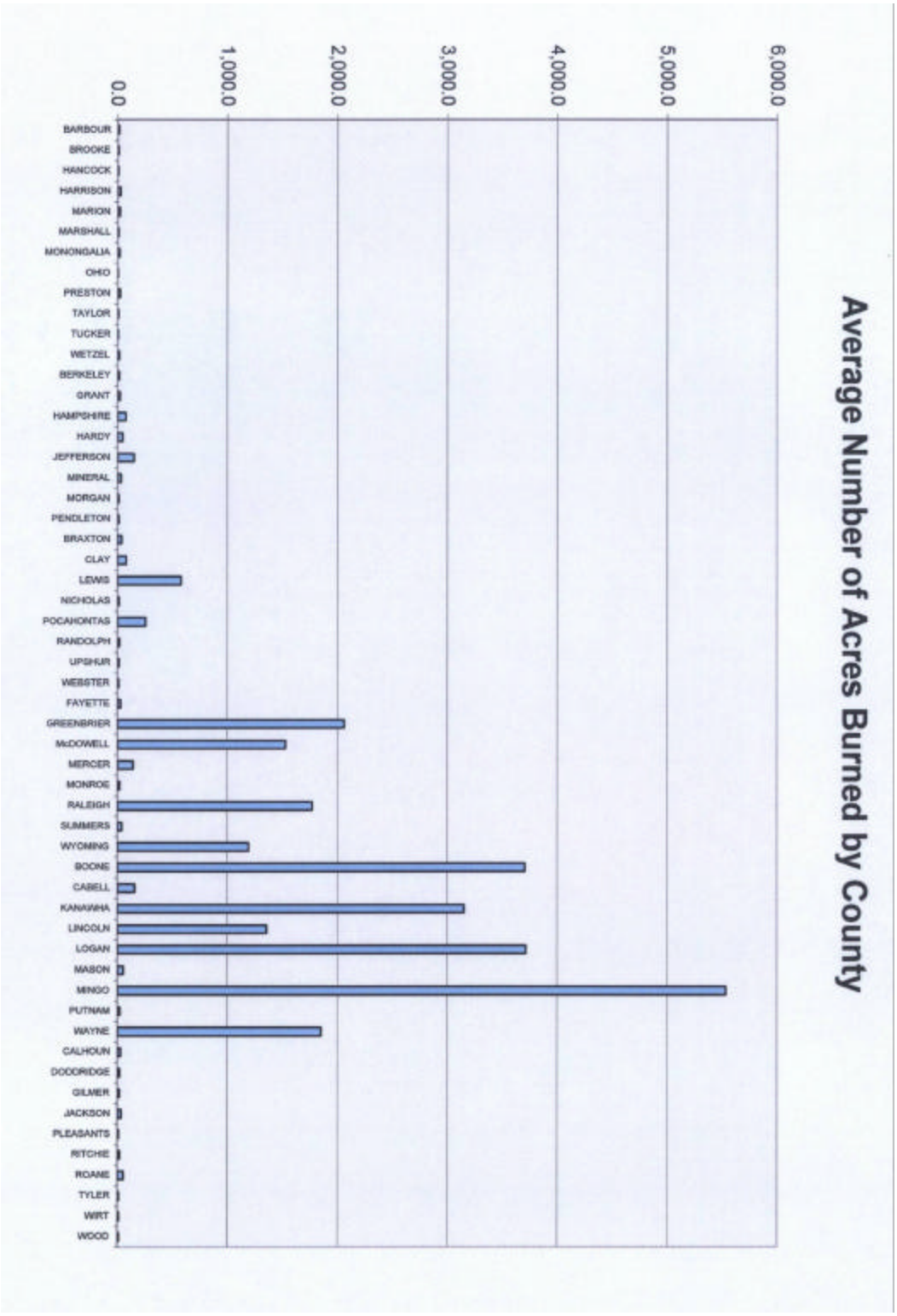

Figure 8.1F: Average Number of Acres Burned by County in West Virginia.

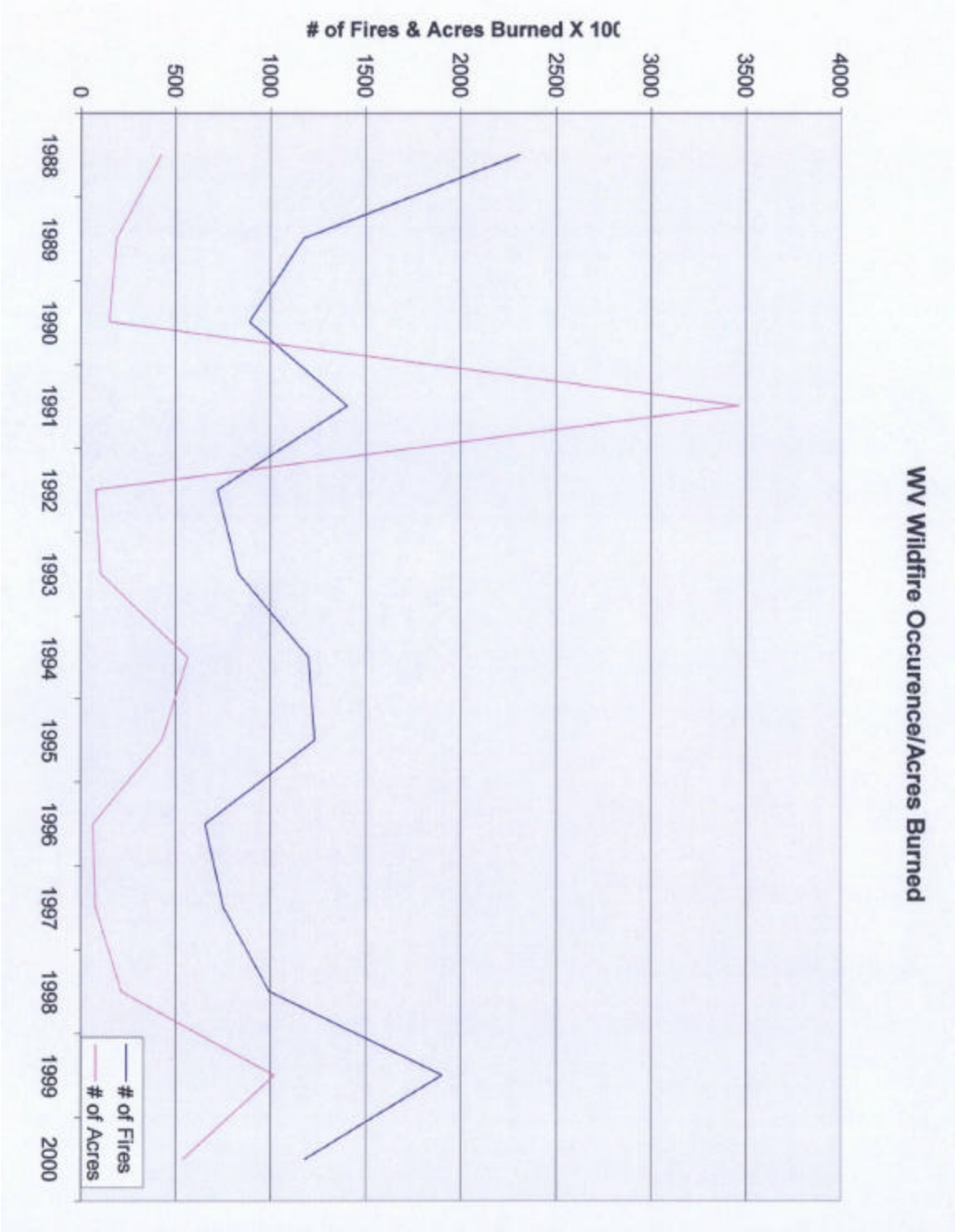

Figure 8.1G: West Virginia Wildfire Occurrences and Acres Consumed.